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INFORMATION TECHNOLOGY MEDIATED CUSTOMER SERVICE: A FUNCTIONAL PERSPECTIVE

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Abstract

Companies can use information technology not only to conduct transactions with their customers but also to provide them with valuable functionalities before, during, and after those transactions, such as recommendations on what products to buy or to track product delivery. The e-Business environment provides a particularly fertile ground for leveraging IT resources to provide functionality. Although the general perceptions of online service quality and self-service technologies have been extensively studied, there has not yet been a through investigation into the specific ***functionality*** *that IT can provide for delivering services that supplement a core product offering. This paper examines the role of IT as a service delivery mechanism. Drawing on a customer service life cycle framework and the concept of supplementary service, we propose and operationalize the construct of functionality: the broad array of IT applications that can enhance a customer's experience with a company beyond just the core offering. Functionality focuses on specific IT-based service tools as opposed to broad perceptions of service (e.g., service quality) and so targets a key IT artifact. A cross-sectional survey of current e-Business customers was used to validate the multidimensional functionality construct as well as to test a theoretical model relating functionality to the consequences of satisfaction, perceived website usefulness, and continued website usage. The results support that functionality is not only a conceptually valid construct but also one that is highly regarded by e-Business customers.*

Keywords: e-Business, functionality, online customer service

Introduction and Objectives

E-Business has greatly accelerated the shift in focus for information technology from an internal management tool to one that is customer-facing (Straub and Watson 2001) and best represents the ever increasing trend of information technology (IT) infusing itself into all types of customer service (Bitner et al. 2000). It is a unique channel for providing customer service with its ability to personalize, automate, and inform across spatial and temporal boundaries (Straub and Watson 2001; Weill and Vitale 2001). In many cases, customer service is not only infused with IT, it is solely mediated by it. Within e-Business especially, the technology enabled interface—in the form of a website such as Amazon.com—may be the *only* interface between customer and company (Benbasat and DeSanctis 2001). IT—in the form of a website—can act as a *customer service delivery mechanism* whereby service is provided directly to a customer through an IT (web) interface.

Such IT-mediated customer service provides for numerous and elaborate opportunities for companies to deliver service to their customers, either enhancing traditional services or providing services *not otherwise possible offline*. This study explores, defines,and articulates those customer service features and tools made possible by IT in the e-Business environment, what we refer to as *functionality*. We will develop and operationalize the construct of functionality at two levels of abstraction. At the general level is the overall concept of functionality as perceived by a website's customers. At the second level are the specific constituent dimensions of functionality, such as payment, maintenance,and product specification assistance. Having explicated functionality as a construct of interest, we then theorize and test that functionality is an important predictor of key e-Business success factors.

This paper is structured as follows. In the next section, we describe functionality and its importance in the e-Business environment. We then explicate the functionality construct from both information systems and marketing perspectives, and develop an overall theoretical model that relates functionality to the key dependent variables of satisfaction, usefulness, and continued website usage. We describe how we tested the model using a field survey of current e-Business customers and the results. The paper concludes with a discussion of the results that support our theory and the implications for research and practice.

Functionality: Supplementary Services Through Information Technology

Companies are vigilant to the need to remain competitive. Offering a better quality and/or cheaper product[1] is a direct way of competing. However, advantage can also be gained by offering supplementary services that go beyond the core product(s) that a company offers (Lovelock 1994). An example is a hotel and its core product of lodging. Supplementary services, such as concierges and access to fitness facilities, are outside the scope of the direct room offering. In some cases, these added functions may be *more important* for gaining advantage than the quality of the product itself (Ives and Vitale 1988; Piccoli et al. 2004) and thus make the difference in which hotel a guest chooses to stay or the price willing to be paid.

Straub and Watson (2001, p. 340), in their prescriptions for IT e-Business research, raise the question, "How do firms use electronic networks to differentiate products and services?" We submit that functionality is one such means of differentiation and that IT, particularly in the e-Business environment, provides the infrastructure for that functionality. Taken a step further, IT provides the means for developing functions *otherwise infeasible*. For instance, FedEx provides functions via their website that allow customers to track package delivery status in near real time. To mimic the same tracking function offline would be cost prohibitive—if not impossible—by requiring tens of thousands of employees. As a result, functionality is a vital area for online businesses to consider as a means of supplementing their core product offering.

Functionality deals with *what* services a company can provide rather than *how well* those services are provided. To be sure, *service quality*, which describes *how well* a service is provided, has been widely studied in IT and e-Business contexts (e.g., Devaraj et al. 2002; Gefen 2002; Kettinger and Lee 1997). What has been left relatively unexplored, however, is the set of *specific* functionalities that can be deployed to fulfill the supplementary services noted above. Thus, in addition to looking at *how* service is delivered (was it reliable, responsive, etc.), we also need to investigate *what* those functionalities are; for example, Amazon.com provides book recommendations (a functionality) that may or may not be reliable or responsive (the quality of that service).

Functionality: An Explication and Theoretical Model

Our primary proposition is that website functionality is an important and IT-specific phenomenon that is a significant predictor of customers' outcome expectations, their overall satisfaction, and their willingness to use a website. In addition, we model functionality at both a global level as well as at a more specific dimensional level. An overall depiction of our research model is shown in Figure 1.

Explication of Functionality

Functionality remains an under-examined construct both in terms of its potential nature and facets as well as potential impacts on business success. Given the nature of e-Business as both a marketing and information system (Gefen et al. 2003), the concept of supplementary service is useful for describing the various opportunities that exist to provide additional value and competitive differentiation beyond the core buy/sell transaction. Although not directly referred to as supplementary service, the IS field has considered the potential of technology as a tool for providing enhanced customer service and thus gaining advantage through differentiation. Ives and Learmonth (1984) proposed the customer service life cycle (CSLC) as a framework for those very goals. The CSLC derives from the process a customer goes through when first learning of a product, acquiring it, taking ownership and finally disposing of or replacing the product. The focus of the CSLC is *not* a chronological process, but a framework for identifying the potential applications that can be fulfilled through the use of IT across the spectrum of interactions that take place between company and customer (Gonsalves et al. 1999; Lightner 2004). Table 1 lists and describes the CSLC dimensions. Each of these functional dimensions can be used as a basis to spawn an IT-mediated service application. For example, Amazon's auto-

[1]For the sake of brevity, we will use the term product to encompass both products and services.

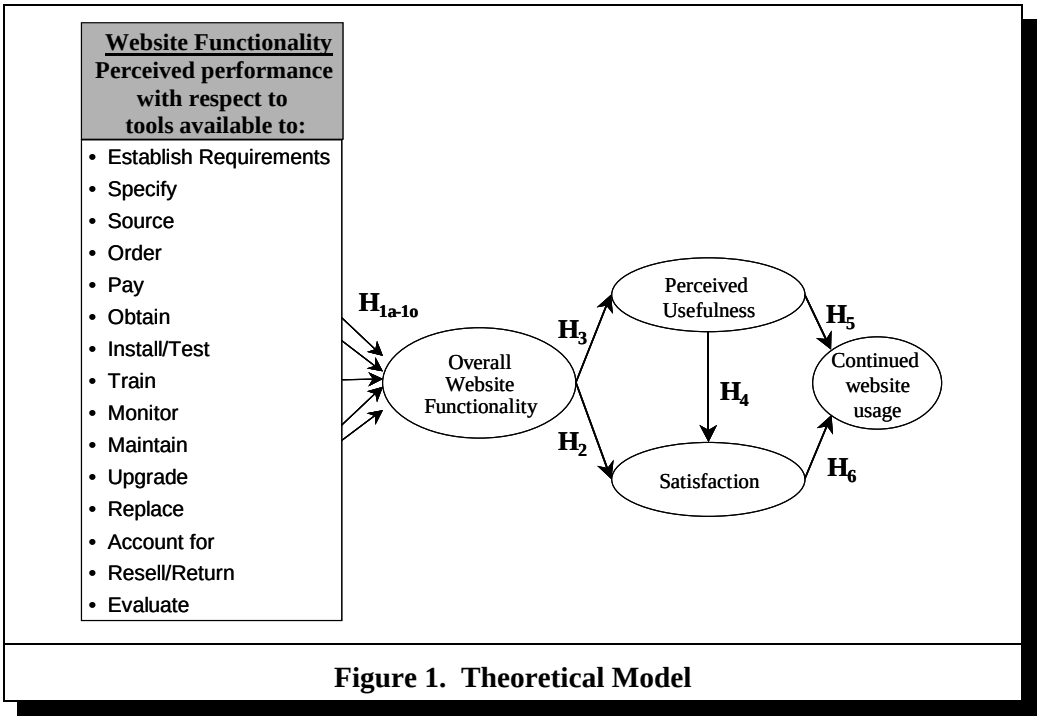

Figure 1. Theoretical Model

mated product recommendations can be derived from the *establish requirements* dimension. Using *monitor* as another example, wireless companies can provide customers with reports on their cellular phone usage and thus determine an optimal usage plan. As a result, the CSLC can provide a foundation to explicate functionality at a detailed level of abstraction. At a general level, functionality is the deployment of IT to facilitate and enhance a core product. At a detailed level, the dimensions of the CSLC can describe more precisely what those services are, such as maintenance, training, and ordering functions.

Table 1. Summary of Customer Service Life Cycle (Adapted from Ives and Learmonth 1984)

Dimension	**Description**
Establish Requirements	Assisting a customer with what product he or she requires
Specify	Helping the customer determine a product's attributes
Source	Where customers will buy a product
Order	Services to help the customer communicate what and how much of a product is desired from the supplier
Pay	Services to transfer funds or extend credit
Obtain	Assisting the customer to take possession of a product
Test & Accept	Services to ensure that a product meets established specifications
Train	Helping the customer to make use of the product to its full extent
Monitor	Helping the customer monitor use and behavior of a product
Maintenance	Repairing a product and keeping it in proper working order
Upgrade	Services that alert the customer to newly available attributes, new products, or automatic upgrades to a product
Replace	Features that assist in providing another product for one that has been consumed or is beyond repair
Resell/Return	Helping the customer move, return, or dispose of a product
Account	Helping the customer track where and how much money has been spent with the company
Evaluate	The final tally by the customer of the experience that the customer has had with the company (e.g., feedback)

Theoretical Effects of Functionality

Having formed a basis for the explication of functionality, we will next discuss the theoretical relevance of functionality. In determining the framework for functionality, we have described the construct at both a general level of abstraction as well as in detail using the CSLC as a guiding framework. The dimensions of the CLSC describe the varied ways in which IT can be deployed to facilitate and enhance a core product. As a result, the provision of functions that address any or all of the constituent dimensions of the CSLC will enhance the *general* level of website functionality. This leads to the following hypothesis regarding the relationship between the specific and general levels of abstraction of functionality

> **Hypothesis 1_a - 1_o:** The individual dimensions of functionality, derived from the CSLC, will each have a positive effect on a customer's perceptions of a website's *overall* functionality.

As functionality describes the realm of specific supplementary services available through the use of IT, we expect functionality to fulfill customer needs and so positively impact customer satisfaction. Satisfaction is a globally evaluative judgment regarding a specific referent (Bagozzi et al. 1999), in this case a website. Satisfaction is a useful measure of overall website performance as it captures both cognitive and emotional feelings of the user (Smith and Bolton 2002). Particularly within the scope of IS in general, and e-Business systems specifically, satisfaction has been heavily relied upon as key dependent performance variable (Bhattacherjee 2001; DeLone and McLean 2003; Devaraj et al. 2002; McKinney et al. 2002). Satisfaction is a useful measure of e-Business customer value as well as a highly valid measure of system success (DeLone and McLean 1992). We posit that increased levels of website functionality, as perceived by the customer, will lead to increased customer satisfaction with the website.

> **Hypothesis 2**: A customer's perceptions of a website's overall degree of functionality will positively influence customer satisfaction with using that website.

Recognizing that an e-Business website is both a vendor and a system (Gefen et al. 2003), it is important to consider system-specific consequential variables such as found in the technology acceptance model (TAM, Davis 1989; Davis et al. 1989). TAM posits that beliefs about a perceived usefulness and perceived ease of use are mediators of the externally oriented beliefs about a system on a user's desire to adopt and continue usage (Venkatesh 2000; Venkatesh et al. 2003). However, the effect of ease of use dampens with continued usage experience (Karahanna et al. 1999; Venkatesh et al. 2003). A necessary context of our research model is that functionality can best be ascertained through some extended degree of usage in order to best evaluate all of the possible dimensions of functionality. In addition, various functions, such as post-purchase evaluations, upgrading mechanisms, and maintenance features, can only be assessed *after* several interactions with a particular website. As a result, the importance of ease of use diminishes relative to perceived usefulness.

Customers gain utility from how the website enhances the purchasing process, including prepurchase information gathering and after-sales servicing. This enhancement takes place through functions that help the customer in the overall purchasing process. Usefulness mediates the influence of external beliefs on user behavior, such as those regarding a system's attributes and capabilities. Functionality describes the specific IT-mediated service capabilities that should foster a greater likelihood of use. These beliefs in the capability of the website to deliver these services should have an effect on usage only if customers in turn perceive the services to be useful. As a result, functionality will enhance the quality and effectiveness of the core transaction and so increase a customer's perceptions of the usefulness of that website.

> **Hypothesis 3**: A website's overall degree of functionality will have a positive effect on a customer's perceived usefulness of a website.

Satisfaction as an Attitudinal Construct Within TAM

TAM was originally derived from the theory of reasoned action (TRA, Ajzen and Fishbein 1980), which posits that an individual possesses a variety of beliefs that ultimately create an overall evaluative attitude which, in turn, influences behavior. The original TAM posited that the effects of ease of use and usefulness beliefs on usage were mediated by *attitude* toward using the system. Interestingly, satisfaction is commonly recognized as a quasi-attitudinal construct (Bagozzi et al. 1999) and often considered fully as an attitude (Fournier and Mick 1999). As a result, satisfaction plays a similar, if not identical, role to that of attitude in technology usage. Of course, the vast majority of studies incorporating TAM *omit* attitude as its influence on technology usage behavior has been equivocal (Venkatesh 2000). For example, a high degree of usefulness (e.g., helping employees do their job) may dominate a user's choice to use a system even if their attitude is neutral or negative. Most recently, Venkatesh et al. (2003)

demonstrated that attitude was explicitly *not* important in the usage decision. Although excluded from most TAM studies, we argue for the inclusion of satisfaction as an attitudinal construct on the basis of the e-Business context and its nature of being both vendor and system. E-Business differs from the organizational setting (e.g., employee as user) that usually serves as the context for most TAM research. Certainly, usefulness will play a role in a customer's interacting with an e-Business website as a system. However, it will not dominate a customer's attitude to the system to the same degree as would occur in a purely job-oriented context. Customers seek more than just utility in service-oriented environments; they also want to fulfill their emotional needs, such as enjoyment (Meuter et al. 2000). As noted, in purely marketing contexts satisfaction is the *primary* driver of buyer behavior. Combining technology and marketing contexts thus leads to an amalgamation of variables salient to both contexts, including usefulness and satisfaction. Consistent with the original TAM (and TRA), satisfaction, as an attitudinal construct, will partially mediate the effect of usefulness on intentions to continue using a given website.

> **Hypothesis 4**: A customer's perceived usefulness of a website will have a positive effect on that customer's overall satisfaction with using the website.
>
> **Hypothesis 5**: A customer's perceived usefulness of a website will have a positive effect on the customer's desire to continuing using that website.
>
> **Hypothesis 6**: A customer who is more satisfied with using the website will be more likely to continue to use that site in the future.

Method

Overview of Method

We developed measures of functionality at both general and specific levels of abstraction. Using a field survey methodology, we used these measures to gather data on a variety of e-Business websites with the assistance of a panel of current e-Business customers. These participants provided evaluations of a target website's functionality, as well as the usefulness of the website to their shopping needs, their satisfaction with the site, and how likely they would continue to use the site in the future. These data were then used to validate functionality (globally and dimensionally) and to test the overall theoretical model using structural equation modeling techniques.

Functionality Measurement Item Development

We generated 3 or 4 items for each of the 15 CSLC dimensions (46 in total) as well as 4 items for the overall functionality construct. To support construct validity and evaluate how well the items tapped the dimensions of the CSLC originally used in their derivation, we conducted a card sorting exercise with the assistance of eight judges (Moore and Benbasat 1991). The judges used in the card sorting exercise were drawn from an e-Business consumer pool (56 percent female, average age of 34, with 5.3 purchases made online in the last 12 months). Each judge was presented with the 15 CSLC dimensions, definitions for each dimension, and a randomly sorted list of the 46 dimension-specific items. The 4 items measuring global functionality were excluded from the sort as this construct and its items intentionally overlap all of the 15 functionality dimensions. The judges were instructed to assign each item to one of the 15 functionality dimensions or to an "ambiguous" category if they were unsure of the best placement. The results showed that all eight judges had difficulty in discriminating between the *establish requirements* and *specify* dimensions. These are conceptually similar in that both describe meeting a customer's prepurchase needs. Consolidating these two dimensions into one resulted in an overall average "hit ratio" of 85 percent across the resulting 14 dimensions, a good indication of construct validity.[2] Items for the dimensional and overall functionality constructs are described in Appendix A.

Measurement Item Development for the Consequences of Functionality

The consequent constructs of perceived usefulness, satisfaction, and continued website usage have been extensively studied in the past, allowing us to derive our measures for these constructs from pertinent prior literature. The scale for perceived usefulness

[2]The hit ratio is calculated as the ratio of "correct" item placement to total placements across all dimensions (Moore and Benbasat 1991).

was adapted from empirical studies conducted within general IS research as well as the specific context of e-Business (Davis 1989; Devaraj et al. 2002; Gefen et al. 2003; Venkatesh 2000; Venkatesh et al. 2003). We measured satisfaction using a four-item semantic scale adapted from two prior empirical studies, one within IS and one within marketing (Bhattacherjee 2001; Spreng and Mackoy 1996).[3] We measured a person's intentions to continue using the target website using a three-item scale adapted from prior IS studies (Bhattacherjee 2001; Gefen et al. 2003; McKnight et al. 2002). These items are provided in Appendix A.

Field Testing

Using the measures of functionality, perceived usefulness, satisfaction, and continued use intention, we constructed an online survey instrument to gather data both to further validate the functionality constructs and to test the theoretical model. We collected our data using an electronic survey, an appropriate forum for an e-Business context (Bhattacherjee 2001; Boyer et al. 2002). Prior to the field study, we pretested the survey instrument with a convenience sample of 22 students to clarify item wording and assure proper functioning of the online collection instrument. With the instrument, we gathered data from each respondent regarding a target website's performance with respect to the functionality at the two levels of abstraction, as well as the respondent's perceptions of website usefulness, satisfaction with the website, and intention to continue using the site in the future.

Sample

To enhance the study's relevance and generalizability, the study targeted actual e-Business consumers. We sent an invitation to participate in the study via electronic mail to 4,100 members of a panel obtained from a national marketing research firm. For their assistance in the study, participants were provided a point-based incentive redeemable for various prizes. There was no way of assuring adequate delivery to all panelists as a result of disabled email accounts, "spam" filtering, or other blocks that would prevent reception of the invitation. It was possible, however, to note the number of visits to the server hosting the study and thus determine an effective distribution rate. The server recorded 2,582 visits to the site (many of which may not have been unique) and a total of 1,235 individuals that opted to go on and participate. Hence, a conservative estimate of the effective response rate is 48 percent (1235/2582). Of the 1,235 participants, 154 were eliminated due to incomplete responses or data runs resulting in an analysis sample of 1,081. Demographic data for the sample is presented in Table 2. Representativeness of this sample to the general population of e-Business users was supported by a demographic comparison to a major, national study of Internet users conducted by the Pew Internet and American Life Project (Lenhart et al. 2003).[4] A χ^2 test for differences in distribution between our study and the Pew study revealed no significant differences ($p > 0.75$).

Respondents were asked to evaluate a retail e-Business website from which they had made a purchase during the last 6 months. A wide variety of websites were reported on to assure full variance on the constructs of interest. Participants in the study reported on a total list of 292 websites (available from the authors) across the five categories noted in Table 3.

Results

Common Method Bias

To address the potential concern of common method bias from the use of a field survey technique, we applied the Harman (1967) one-factor extraction test. No single factor explained a majority of the variance, thus supporting that a common method bias was not a threat.

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[3]While satisfaction is frequently referred to as a function of the disconfirmation of a priori expectations, our interest is not in satisfaction's specific formation, but only its measure as an outcome of interest (Cronin and Taylor 1992).

[4]The Pew Internet and American Life Project (**www.pewinternet.org**) conducts some of the largest studies regarding the general population's use of the Internet. Their most recent study of general Internet use, cited here, surveyed 3,553 adults and so makes for a useful demographic comparison.

Table 2. Sample Demographic Data

	Present Study	Comparison Study (Lenhart et al. 2003)*
Gender		
Men	34%	50%
Women	66%	50%
Age		
18–29	10%	29%
30–49	60%	47%
50–64	28%	18%
65+	2%	4%
Household Income		
Less than $30,000	15%	18%
$30,000–$49,999	24%	23%
$50,000–$75,000	28%	18%
More than $75,000	33%	26%
Educational Attainment		
Not a high school graduate	0%	5%
High school graduate	13.4%	23%
Some college	35.3%	34%
College or graduate school degree	51.4%	37%

*The numbers for the Pew study do not add to 100% due to participant non-response in their study.

Table 3. Retail Categories Reported

Category	Number of Sites	Percentage of Total
Books	295	27%
Clothing	163	15%
Electronics	110	10%
Music/Video/DVD/Games	170	16%
Other (specified separately)	343	32%
Total	1081	100%

Website Category Effects

We conducted an analysis of the effects of website characteristics on the general results. Bivariate correlations between latent constructs were analyzed for each major category of site studied (e.g., books, clothing, etc.) and compared to the sample pool as a whole (n = 1081). No significant differences were found in these relationships, supporting that while different categories existed, the context of retail consumer e-Business was sufficiently broad to describe the generalizable effects of functionality and its constituent dimensions.

Theoretical Model Testing

The properties of the theoretical model were assessed using LISREL 8.30 (Jöreskog and Sörbom 1999) following a two-step measurement and structural approach (Anderson and Gerbing 1988; Gefen et al. 2000). There were no missing data values to contend with in the analysis. The covariance matrix of the variables representing the constructs was analyzed and compared to the covariance matrix implied by the model in Figure 1 (Bollen 1989).[5]

[5]The complete 60 × 60 covariance matrix is available from the authors upon request.

Measurement Model Assessment

To support the discriminant and convergent validity of the model constructs, we analyzed a measurement model consisting of the 18 constructs allowed to freely correlate with one another (Gefen et al. 2000). The fit for the initial measurement model (Table 4) was marginal as compared to suggested tolerances (Gefen et al. 2000). Furthermore, this initial measurement model did not support discriminant validity between the constructs of *training* and *monitoring* and between *pay* and *ordering*. Payment and ordering functions are logically co-occurring: ordering a product or service almost always involves payment. *Training* and *monitoring* converge since both dimensions tap the broader idea of exploiting an owned product to its fullest capabilities, the former deals with how to better use a product by improving one's knowledge and the latter leverages knowledge about the usage behavior of the product to have it best serve the needs of the organization and its customers. As a result, we combined each of these pairs into single factors, thus reducing the number of functionality dimensions from 14 to 12, and we subsequently reanalyzed the model. As shown in Appendix A, the vast majority of indicator items loaded highly (> 0.70) on their intended constructs (Nunnally and Bernstein 1994). The exceptions to this loading tolerance involved five items from three functionality dimensions: *test/accept*, *order/payment* (two items), *resell/return*, and *monitoring/training*. Given that this was only a minor amount of items relative to the 50 functionality items in the model and that all dimensions would retain at least 2 items, we decided to drop these items from further analysis.

With the combined dimensions and revised items noted above, we repeated the measurement model analysis. The revised measurement model was improved over the initial model with fit statistics largely in line with recommended tolerance levels (Table 4). Although some of the fit statistics were slightly beyond suggested thresholds, lower thresholds for these statistics are plausible for highly complex models with a large number of constructs and items, as would apply in this case (Carmines and McIver 1981; Netemeyer et al. 2001).

We assessed the internal consistency of the construct measures using Cronbach's alpha, composite reliability, and the average variance extracted (AVE). All constructs were well in excess of the recommended 0.70 (Nunnally and Bernstein 1994), 0.70 and 0.50 (Fornell and Larcker 1981) respective thresholds recommended for these statistics, thus supporting convergent validity. We evaluated discriminant validity by comparing the square root of AVE with the correlations between constructs (Fornell and Larcker 1981). The square root of AVE for a construct should be greater than the correlations with any other construct to support that the variance shared between a construct and its measures exceeds the variance shared by that construct with other constructs. All 16 constructs in the model met this test (see Appendix B).

Structural Model Assessment

We next assessed the structural model based upon the theoretical model shown in Figure 1. The results for the structural model are shown in Figure 2 with associated fit statistics shown in Table 5. In partial support of Hypothesis 1, seven of the twelve dimensions of functionality were significant predictors of overall functionality. The functional dimensions of *accounting*, *evaluate*, *test/accept*, *obtain*, *order/payment*, *replace*, and *specify/establish requirements* had a significant ($p < 0.05$) influence on overall functionality. The remaining five dimensions of *maintenance*, *monitoring/training*, *resell/return*, *source*, and *upgrade* did not have a significant effect on overall functionality. Together, the individual dimensions of functionality explained 72 percent of the variance in overall functionality.

Table 4. Measurement Model Fit Statistics

	Initial Model	Final Model	Desired Levels
χ^2	5209.90	4336.14	Smaller
Degrees of freedom	1557	1310	
χ^2/df	3.35	3.31	<3.00
GFI	0.86	0.87	>0.90
AGFI	0.83	0.84	>0.80
Standardized RMR	0.062	0.046	<0.050
RMSEA	0.05	0.05	<0.08
NFI	0.93	0.92	>0.90
CFI	0.95	0.94	>0.90

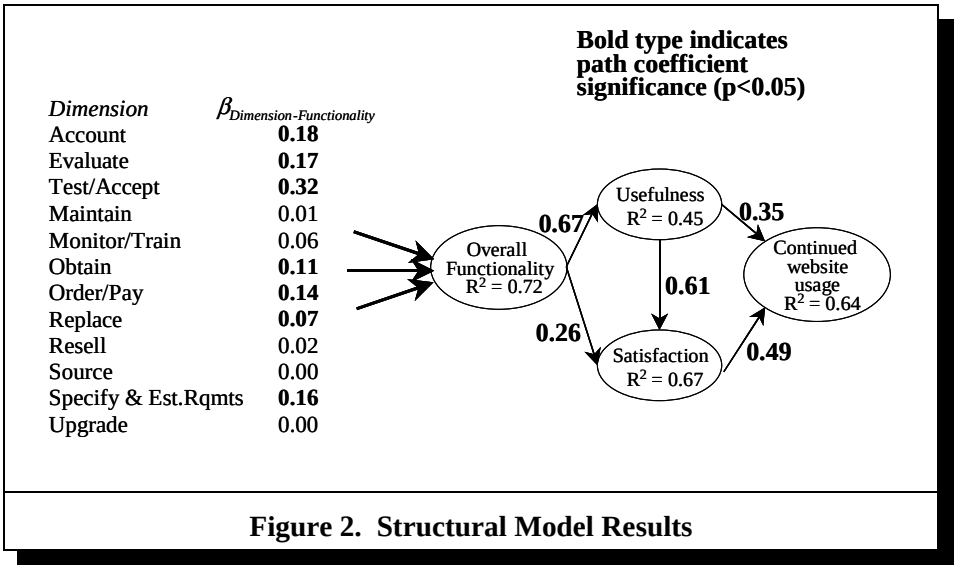

Figure 2. Structural Model Results

Table 5. Structural Model Fit Statistics

	Results	Desired Levels
χ^2	4916.96	Smaller
Degrees of freedom	1347	
χ^2/df	3.65	<3.0
GFI	0.87	>0.90
AGFI	0.83	>0.80
Standardized RMR	0.040	<0.050
RMSEA	0.05	<0.08
NFI	0.91	>0.90
CFI	0.93	>0.90

All other hypotheses (2 through 6) were fully supported. Functionality was a significant predictor of both perceived usefulness ($\beta = 0.67$, $p < 0.05$) and satisfaction ($\beta = 0.26$, $p < 0.05$). Both usefulness and satisfaction were significant contributors to continued website usage intentions ($\beta_{Useful\text{-}Intent} = 0.35$, $\beta_{Satisfaction\text{-}Intent} = 0.49$, $p < 0.05$). The explained variance of usefulness, satisfaction, and intention to continue website usage was 45 percent, 67 percent, and 64 percent respectively. Not only was satisfaction an important predictor of usage, it also served to partially mediate the effects of usefulness on usage ($\beta = 0.61$, $p < 0.05$). The indirect effect of usefulness on usage was 0.30 versus a direct effect of 0.35. Fit statistics were in line with recommended tolerance levels again bearing in mind the complexity of the overall model (Table 5).

To test the robustness of the theory to our modeling choice, we also analyzed the direct effects of the dimensions of functionality without the mediation of the overall functionality construct.[6] In order to analyze such a model, we created a second order *aggregate* construct consisting of a weighted sum of the 12 individual dimensions of functionality. Aggregate constructs are similar to formative constructs, inasmuch as the causal indicators *cause* variance in their associated higher order constructs (Chin and Gopal 1995; Diamantopoulos and Winklhofer 2001; Edwards and Bagozzi 2000; Jarvis et al. 2003).[7] Since LISREL does not permit the modeling of such aggregate constructs, we analyzed this revised model using partial least squares (PLS), applying PLS-Graph version 3.00 (Chin 2001). As an aggregate construct, functionality's effect on usefulness and satisfaction remained

[6]We thank the three anonymous reviewers who suggested this alternative approach.

[7]As recommended by Edwards (2001), we use the term *aggregate* rather than *formative*. Although similar in nature, formative constructs are modeled with observable variables, whereas the measures of aggregate constructs are themselves constructs, as is the case with the 12 individual functionality dimensions.

significant and positive in magnitude ($\beta = 0.73$ and 0.41 respectively, $p < 0.05$) with little change in variance of usefulness and satisfaction explained as compared to the original model (53 percent and 62 percent respectively).

Discussion

The results of both a qualitative sorting exercise and a quantitative field survey supported the validity of e-Business functionality encompassing 12 specific dimensions originally derived from the CSLC. The results supported that a variety of services can be supported in the online environment using IT as the only interface between customer and company. These services include assistance with product attribute specifications, obtaining the product and product testing capabilities, and many more. In other words, an e-Business website can be more than just a transaction engine; it can act as a customer service delivery mechanism.

This paper also served to demonstrate the theoretical influences of functionality. The results supported that functionality is an important predictor of online customers' perceptions of an e-Business website's usefulness, their satisfaction, and ultimately their continued usage of that website. In the e-Business environment, where an individual is both technology user *and* customer, functionality is a theoretically important variable. In addition, the results also further supported the role of attitudinal constructs such as satisfaction in predicting e-Business usage, even if such constructs are equivocal in job-related contexts (Venkatesh et al. 2003).

Managerial Implications

A functionality perspective provides specific guidance for the design and operation of a company's IT assets, a potential shortcoming of broad abstract perceptual models (Benbasat and Zmud 2003; Orlikowski and Iacono 2001; Taylor and Todd 1995). For practitioners, the results provide both general and specific guidance on what to improve in their online customer service efforts. The identified functionality dimensions can be used with existing websites to compare against competing websites, to identify deficiencies, or simply as a design checklist to assure that all possible IT-mediated service functions are being leveraged. A focus on functionality helps practitioners address *what* services, tools, and functions are important in addition to the *how* of gaining benefit through models such as SERVQUAL or TAM.

Limitations

Five of the 12 functionality dimensions were not supported as predictive of overall functionality. *Sourcing*, as one example, was not a significant functionality dimension in the presence of other dimensions. This may be the result of customers already knowing that they are visiting a particular site to get a product. In other words, a visitor to Dell.com does not need a function to help find a computer retailer source. Other dimensions may lack significance due to requiring more extensive use of the site and/or the context of the study. For example, maintenance functions may be unimportant in a business-to-consumer context (e.g., books) but they may be far more important for business-to-business applications. Although our study was bounded by a product-oriented business-to-consumer context, the construct of functionality clearly applies to business-to-business or other service domains. These alternative contexts would likely *change* the relative significance of the individual dimensions of functionality. Further, it should also be noted that while the functionality dimension weights are indicative of *relative* importance, **it does *not* mean they are unimportant**. Significant, positive bivariate correlations between the lower weighted functionality dimensions and overall functionality support that these dimensions can also contribute to continued usage. Finally, we must acknowledge that there are a variety of reasons people choose to patronize one website over another, such as price, selection, even habit (Limayem et al. 2005). We did not control for these and other factors in our study that may help explain the dependent variables.

Future Research

This study looked at functionality in the context of product-oriented consumer e-Business. Sample limitations prevented a more fine-grained analysis by a particular type of product, books versus travel for example. Product or service considerations may well play a role in the relative importance of the dimensions of functionality and are worth further investigation. As noted above, functionality applies to other IT contexts such as business-to-business relationships. Future research should investigate these other environments. This will serve to test the stability of the broad functionality construct, as well as the nature of the more specific aspects of functionality.

Conclusion

This paper introduced the concept of functionality, the use of IT to deliver added services to facilitate and enhance a core product transaction. In addition to explicating this important and under-researched concept, we proposed a theory that functionality was an important predictor of continued website usage as mediated by a customer's beliefs about the site's utility and their satisfaction with the site. The results of a field survey supported both the nature and effects of functionality. To reiterate the question raised by Straub and Watson (2001), "How do firms use electronic networks to differentiate products and services?" The answer can lie in developing and deploying IT assets to deliver functionality and so provide services that facilitate and enhance buy and sell transactions.

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Appendix A. Instrument and Measurement Properties[8]

Item		Mean (std dev)	Factor Loading
Functionality (Dimensional): 7 point Likert agreement scale preceded by the statement "The tools provided by the site…"			
Account			
ACCOUNT1	... allow me to track where and how much money is being spent	4.46 (2.23)	0.75
ACCOUNT2	... allow me to get reports on my financial transactions with the company	4.10 (2.22)	0.81
ACCOUNT3	... allow me to get a detailed history of the goods I ordered from this website	5.16 (1.96)	0.72
Evaluate			
EVALUAT1	... allow me to provide feedback to the company	5.89 (1.45)	0.88
EVALUAT2	... allow me to communicate with the company	5.92 (1.37)	0.84
EVALUAT3	... allow me to provide my evaluation of the product to the company	5.34 (1.87)	0.70
Maintain			
MAINT1	... provides information that help me keep the product in good working order	3.62 (2.01)	0.77
MAINT2	... help me repair a product	2.89 (1.82)	0.92
MAINT3	... help me do maintenance on the product	2.82 (1.79)	0.95
Monitor			
MONIT1	... help me control the use of my product	3.81 (1.94)	0.91
MONIT2	... help me monitor how I am using the product	3.39 (1.89)	0.88
MONIT3	... help me as a customer track ongoing usage	3.85 (2.09)	0.70
Obtain			
OBTAIN1	... assure I get the product	6.10 (1.26)	0.91
OBTAIN2	... allow me to obtain the product	6.27 (1.07)	0.87
OBTAIN3	... assure satisfactory delivery	6.11 (1.27)	0.93
OBTAIN4	... assure simple delivery	6.15 (1.21)	0.91
Order			
ORDER1	... facilitates the ordering process	6.11 (1.14)	0.81
ORDER2	... allow me effectively conduct a buying transaction online	6.27 (1.07)	0.91
ORDER3	... has all of the functions needed to order a product	6.22 (1.09)	0.88
Pay			
PAY1	... provides the necessary functions to make a payment	6.38 (1.01)	0.93
*PAY2**	*... provides multiple options of how to pay*	*5.96 (1.39)*	*0.56*
*PAY3**	*... allow me to make a payment*	*6.06 (1.47)*	*0.48*
Replace			
REPLAC1	... help me replace a product	4.30 (2.05)	0.90
REPLAC2	... help me replace my product if I need another product	4.39 (2.03)	0.92
REPLAC3	... allow me to find where to get a replacement product in case mine is not working	3.96 (2.09)	0.74

Resell/Return			
RESELL1	... allow me to return or get rid of a product by using the tools online	4.92 (1.93)	0.87
RESELL2	... includes features that aid in my return (or disposal) of a purchased product	4.90 (1.87)	0.90
*RESELL3**	*... allow me to find buyers to sell a product second hand*	*3.51 (2.45)*	*0.18*
Source			
SOURC1	... help me find an online merchant for the product	4.60 (2.06)	0.90
SOURC2	... makes it easy for me to find an online store to obtain the product	4.75 (2.03)	0.90
SOURC3	... allow me to find out who sells the product.	4.74 (2.04)	0.84
Specify & Establish Requirements			
SPECER1	... help me establish my product requirements	5.66 (1.29)	0.83
SPECER2	... help me in determining my product needs	5.46 (1.41)	0.90
SPECER3	... help me better figure out my product requirements	5.41 (1.41)	0.92
SPECER4	... help me determine the attributes of the product I intend to buy	5.78 (1.24)	0.77
SPECER5	... aids me in identifying which product attributes best fit my needs	5.46 (1.42)	0.84
SPECER6	... lets me specify the product features that I want	5.32 (1.61)	0.70
Test & Accept			
TEST1	... allow me to verify the acceptability of a product before I use it	5.11 (1.66)	0.73
*TEST2**	*..., where appropriate, allow me to test or try the product online*	*3.35 (2.00)*	*0.50*
TEST3	... provide me with enough information to determine the quality of the product before buying	5.42 (1.44)	0.82
Train			
*TRAIN1**	*... help me learn about the product*	5.65 (1.38)	*0.56*
TRAIN2	... show me how to use the product	3.96 (1.94)	0.87
TRAIN3	... help me use a product to its fullest extent	4.21 (1.93)	0.92
Upgrade			
UPGRAD1	... allow me to upgrade a product	3.32 (1.97)	0.88
UPGRAD2	... let me upgrade the product and know if my requirements change	3.10 (1.91)	0.95
UPGRAD3	... inform me when improvements to the product are available	3.23 (2.00)	0.82
Overall Functionality: 7 point Likert agreement scale preceded by the statement "The website…"			
OVRFUN1	...has tools and functions that provide services beyond just the product that I may be purchasing	5.42 (1.57)	0.72
OVRFUN2	...has tools that help me before, during and after purchase	5.65 (1.45)	0.86
OVRFUN3	...has helpful features which add value to my overall product experience	5.47 (1.53)	0.87
OVRFUN4	...provides functions that help me in the in the various stages I go through to acquire a product	5.74 (1.35)	0.89
Functionality Consequences			
Satisfaction: "Overall, how do you feel about using the website?" (semantic differential with the following			
SATIS1	Dissatisfied/Satisfied	6.12 (1.09)	0.87
SATIS2	Terrible/Delighted	5.74 (1.10)	0.87
SATIS3	Frustrated/Contented	5.83 (1.31)	0.90
SATIS4	Displeased/Pleased	5.99 (1.17)	0.91
Continued Website Usage Intention - (7 point Likert agreement scale)			
CUI1	I would consider using the site for future purchases	6.58 (0.98)	0.94
CUI2	I have no desire to buy from the website [R]	6.70 (0.88)	0.79
CUI3	How likely is it that you will visit the website again in the future?	6.65 (0.88)	0.87
Perceived Usefulness - (7 point Likert agreement scale)			
USE1	Using the site enabled me to shop more quickly	6.04 (1.20)	0.82
USE2	In my opinion, using the site increased my shopping effectiveness	5.94 (1.27)	0.86
USE3	Overall, the site was useful for shopping	6.26 (1.05)	0.92

** Item dropped from final analysis*

[R] - Reverse coded item. Statistics are based upon the transpose of the original scale.

Note: After consolidating the order and pay constructs, the standardized loadings on the single order/pay construct were as follows: ORDER1 (0.81), ORDER2 (0.91), ORDER3 (0.88), PAY1 (0.77), PAY2 (0.48), PAY3 (0.39). For the consolidated monitor/train construct, the revised loadings were: MONIT1 (0.91), MONIT2 (0.88), MONIT3 (0.70), TRAIN2 (0.87), TRAIN3 (0.92), TRAIN1 (0.56).

Appendix B. Correlations of Latent Variables

		Alpha	Fornell	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Account	0.80	0.80	**0.76**															
2	Evaluate	0.82	0.84	0.43	**0.80**														
3	Maintenance	0.90	0.91	0.33	0.20	**0.88**													
4	Monitor/Training	0.91	0.92	0.36	0.32	0.72	**0.83**												
5	Obtain	0.95	0.95	0.31	0.47	0.20	0.30	**0.90**											
6	Order/Payment	0.90	0.91	0.34	0.45	0.12	0.20	0.73	**0.84**										
7	Replace	0.88	0.89	0.28	0.33	0.57	0.49	0.36	0.28	**0.86**									
8	Resell	0.88	0.88	0.41	0.56	0.37	0.45	0.51	0.42	0.46	**0.89**								
9	Sourcing	0.91	0.91	0.34	0.30	0.35	0.41	0.29	0.35	0.30	0.25	**0.88**							
10	Specify & Est. Req.	0.92	0.93	0.30	0.40	0.30	0.44	0.55	0.56	0.33	0.41	0.45	**0.82**						
11	Test/Accept	0.75	0.76	0.39	0.49	0.41	0.58	0.59	0.55	0.52	0.61	0.47	0.67	**0.78**					
12	Upgrade	0.91	0.92	0.36	0.22	0.82	0.69	0.23	0.12	0.61	0.36	0.35	0.32	0.42	**0.88**				
13	Overall Functionality	0.90	0.90	0.52	0.59	0.33	0.43	0.61	0.60	0.47	0.57	0.41	0.62	0.72	0.35	**0.84**			
14	Satisfaction	0.94	0.94	0.34	0.50	0.19	0.30	0.66	0.70	0.28	0.42	0.34	0.56	0.60	0.18	0.63	**0.89**		
15	Usefulness	0.91	0.90	0.35	0.47	0.18	0.25	0.66	0.74	0.29	0.38	0.37	0.62	0.58	0.20	0.62	0.80	**0.87**	
16	Continued usage	0.90	0.90	0.29	0.44	0.14	0.20	0.62	0.63	0.25	0.34	0.26	0.42	0.47	0.15	0.56	0.77	0.75	**0.87**